

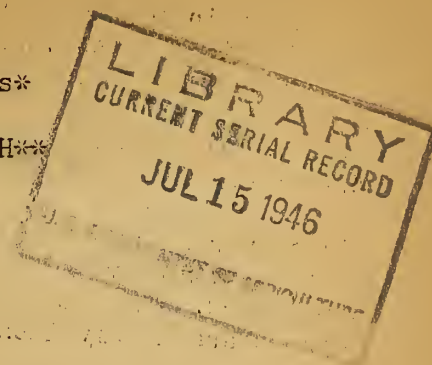
Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Summary Review of Monthly Reports*
for
SOIL CONSERVATION SERVICE RESEARCH**

JANUARY 1945



EROSION CONTROL PRACTICES DIVISION

Conservation Experiment Stations Section

Hugh C. McKay of St. Anthony, Idaho reports: "The different methods of handling sweet clover and sweet clover and grass as a green manure has brought out some interesting differences in the available nitrate nitrogen as shown in the following table:

"Available nitrate nitrogen expressed as ppm. in first 2 feet of soil at seeding time under various treatments of sweet clover and sweet clover and grass. Tetonia, Idaho, 1944.

Treatments	Height of sweet clover at time of plowing					
	12 - 14		20 - 22		30 - 34	
	Cut for hay	Green manure	Cut for hay	Green manure	Cut for hay	Green manure
Moldboard plow						
Sweet clover.....	89	92	79	117	21	19
Sweet clover and grass.	69	76	41	77	22	21
Modified moldboard						
Sweet clover.....	52	48	53	25	20	25
Sweet clover and grass.	38	20	32	26	14	14
Average						
Sweet clover.....	71	70	66	71	21	22
Sweet clover and grass.	53	48	37	52	18	18
Average						
Moldboard.....	79	84	60	97	22	20
Modified moldboard.....	45	34	43	26	17	20
Average						
Treatments.....	62	59	51	61	19	20
Average						
Dates of plowing.....	61		57		20	

*This report is for in-Service use only and should not be used for publication without permission from the Washington Office, Soil Conservation Service Research.

**All Research work of the Soil Conservation Service is in cooperation with the various State Experiment Stations.

"As shown in the above table, the ppm. of available nitrate nitrogen at seeding time is greatest, 61 ppm. in the plots plowed from 12-14 inches. The second series of plots plowed at a height of 20-22 inches showed an average of 57 ppm. and the last series of plots plowed at 30-34 inches showed only 20 ppm. The plots with the greatest amount of green manure turned under showed the least available nitrate nitrogen at seeding time.

"In comparing the two methods of plowing the sweet clover, the moldboard plow has consistently higher ppm. nitrate nitrogen than the modified moldboard plow. This is true except for the last date of plowing where the two methods are nearly identical.

"The utilization of grass with sweet clover tends to cut down in the amount of nitrate nitrogen after fallow at seeding time. It averages about 20 ppm. less, except for the last date of plowing. This decrease is due to the fact that part of the available nitrate nitrogen is tied up in the decomposition of the grass.

"To determine if any benefit is derived from legumes if the crop is taken off as hay, half of each plot was cut for hay and the hay removed. In the moldboard early plowed plots there was nearly the same ppm. nitrate nitrogen in the plots cut for hay as in the green manure, in the medium plowed plots there was about 35 ppm. more in the green manure plots. The opposite is true where the modified moldboard plow was used. The highest amount of nitrate nitrogen was found in the plots cut for hay."

Joel E. Fletcher of Tucson, Arizona reports: "In the study of factors affecting improvement of poor soil structure and low infiltration rates, preliminary results indicate that a green manure crop of guar was about the best treatment tried from the standpoint of increased infiltration. Both sulfur and gypsum treatments significantly decreased the volume weight and increased the percentage of pores drained under a 40 cm. tension in a tight soil. A summary of the results follows:

Treatment	Volume weight	Pct. pores drained under 40 cm. tension	Water infiltrating in the first 3 hrs.
None.....	1.43	6.4	3.23
Guar as green manure.....	1.33	8.2	4.27
Ten tons per acre gypsum....	1.36	8.5	2.36
Sulfur, 2 tons per acre.....	1.35	7.9	3.42

"The difference between the infiltration in the first three hours on the untreated plot and the sulfur treated plots is not significant. The gypsum treated plot took water significantly slower than the untreated plot. The plot treated with guar as green manure is significantly higher in its ability to take up water than any of the other plots."

D. D. Smith of Columbia, Missouri reports: "In determining rates of soil deterioration, estimates of soil loss for 5 types of cropping were made for the major soil types of the State, based upon interpretation of actual measurements at Clarinda, Iowa, Bethany, Columbia and McCredie, Missouri. Adjustments were made for average degree and length of slope for each of the soils. Based upon the 1940 cropping pattern and weighting each resource area as to its acreage, the average annual rate of soil loss from the cultivated sloping farms land of Missouri was calculated to be about 20 tons per acre per year. There was, of course, a wide range of losses for the different groups. The highest loss was from the river hill and loess soils region where the Memphis soil predominated. This was followed by the Knox and Marshall soils areas. The lowest losses were from the southwest claypan areas, in which the Cherokee and Oswego soils predominated, and the southwest border Ozark area composed mainly of Crawford soils."

Harley A. Daniel of Guthrie, Oklahoma reports: "Results of runoff studies on the watersheds at the Guthrie Station are as follow:

"Amount of runoff water from different kinds of plant cover on the watersheds at Guthrie, Oklahoma

Watershed treatment ^{1/}	1944	Average ^{2/}
<u>Runoff - Per cent</u>		
Cultivated terraced land.....	14.46	20.78
Eroded regrassed land.....	9.60	11.58
Native grass and woodland.....	.08	1.16
<u>Precipitation^{3/} - Inches</u>		
Total rainfall.....	31.19	32.34

^{1/} Located on rolling, mainly shallow land.

^{2/} Average of 5 years.

^{3/} Average annual precipitation compiled by Weather Bureau in Guthrie, Oklahoma since 1898 is 32.50 inches.

"This information shows that thick-growing vegetation greatly reduced runoff water loss even on eroded regrassed land."

Oren R. Neal of New Brunswick, New Jersey reports: "Soil temperature records under a mulched and unmulched condition during the growing season were summarized. The average daily range between maximum and minimum soil temperatures during the growing season was about 5° F. under mulch and 10° F. under an unmulched surface. Daily range in air temperatures during the period averaged 21°F.

"The 1944 season completed the third crop year for the rotations on the runoff plots. The average soil loss, during the growing season, from tomatoes in a cropping system of continuous clean cultivation was 5100 pounds per acre. Where tomatoes followed a clover and timothy sod the loss was 3100 pounds per acre. Sweet corn following tomatoes in the clean cultivated system lost 10,300 pounds of soil, while sweet corn following tomatoes in the sod system lost 6800 pounds of soil.

"A high percentage of the annual soil loss from all treatments, whether the quantity was large or small, occurred during the growing season. This has been noted in previous years. It indicates that maximum erosion control will require in addition to soil management and organic matter maintenance practices, the use of contouring and other mechanical practices for protection during the cultivation period."

Charles J. Whitfield of Amarillo, Texas reports: "Forage yield data and grazing records summarized on reseeded pastures give added emphasis to the reseeding program. Forage yields of reseeded mixtures and high yielding pure species show the possibility of increasing production of grass land. The following table gives the 3-year average yields of reseeded mixtures, native pasture and weeping lovegrass:

Mixture or species	Amarillo, Texas - heavy soil	Dalhart, Texas - sandy soil
	Average yield, 1942- 1944. Pounds forage per acre, air dry	Average yield, 1942- 1944. Pounds forage per acre, air dry
Native pasture.....	1,454	1,420
Reseeded mixture of native grasses.....	-	1,766
Reseeded mixture of native grasses and Weeping Lovegrass.....	1,800	2,607
Weeping Lovegrass.....	2,855	3,696

"Reseeded pastures in 1944 consistently outyielded native pasture in beef produced per acre, average daily gain of cattle, higher price for the cattle at market, and higher grade of carcass. The three reseeded pastures grazed produced from \$1.86 to \$5.23 more per acre than native pasture. The high yielding reseeded pasture was seeded to the cool season grasses, western wheatgrass and Canada wild-rye, and these two species and crested wheatgrass are gaining in favor in the reseeding program.

"Studies of the factors affecting the success of the spray method of eradicating mesquite.-During the late summer and fall of 1944, a technique for evaluating the effectiveness of various chemical sprays used in mesquite eradication was devised and tested. This technique consisted of dipping the ends of sprouts into various solutions and after 30 to 60 days recording the length of treated and untreated stem killed. This

procedure has been particularly helpful in obtaining sufficiently replicated data to serve as a guide in evaluating not only the relative toxicities of various chemicals but also in obtaining quantitative data on the effect of the various environmental factors on various sprays. Some of the factors for which preliminary data have been collected and analyzed include (a) the effect of the hydrogen ion concentration (pH) on sodium arsenite solutions, (b) the effect of environmental conditions at the time of spraying on penetration and movement of poisons, and (c) the effect on mobility and toxicity of increasing the spray drying time by the addition of glycerine.

The effect of hydrogen ion concentration.-The effect of different hydrogen ion concentrations on solutions of sodium arsenite, ammonium sulfamate and on a mixture of sodium arsenite and ammonium sulfamate were studied. Tests with sodium arsenite were made on August 28, September 6 and 7 and on October 10. Tests with ammonium sulfamate and a mixture of ammonium sulfamate were made on October 10. These tests indicated the following trends:

- a. Strongly basic (pH of ca. 13.5) sodium arsenite gave significantly the best kill and 'mobility' compared to basic, neutral, acid or strongly acid sodium arsenite and also better than ammate (commercial grade ammonium sulfamate) whether very slightly acid or strongly acid.
- b. Ammate alone, i.e., at a pH of 6.5 gave better kill and 'mobility' than strongly acid ammate (pH 1.00).

"The effect of environmental conditions at and for a period of 3 days after spraying.-The effect of environmental conditions was studied by making tests on five different dates with varying conditions but with the same solution of sodium arsenite. Dates on which tests were made were August 25, September 1, September 6 and 7, and October 10, 1944. Data on spray drying time, evaporation, light, wind, relative humidity, temperature, precipitation and kind and amount of dew were taken. From these tests a set of favorable and unfavorable conditions appear as follows:

Favorable conditions

- a. Low humidity at the time of spraying, provided this is followed by either precipitation or a heavy dew within three days after spraying.
- b. Wind movement none to moderate.
- c. Light conditions dull to moderate.
- d. Spray drying time of 35 minutes or more.
- e. An evaporation rate of 5.5 cc/hour or less.
- f. Precipitation or heavy dew within three days after spraying.

Unfavorable conditions

- a. Strong winds.
- b. Spray drying times of 11 minutes or less.
- c. An evaporation rate of more than 9 cc/hour.
- d. No precipitation or dew in three days following spraying.

"The effect of the addition of glycerine to sodium arsenite sprays.-The effect of adding glycerine to a sodium arsenite spray to increase the drying time was studied in tests made on August 28 and September 6 and 7. In all tests, the addition of the glycerine greatly increased the drying time. On August 28, the time increased from 11.2 minutes to more than 180 minutes; on September 6, the time was increased from 50.2 to 158.9 minutes, and on September 7 from 28.9 to 210.9 minutes. In none of the 142 tests made was this increased drying time accompanied by a significant increase in amount of kill or mobility of the poison.

John T. Bregger of Clemson, South Carolina reports: "Assistance was given to District Conservationist at Hartsville, South Carolina in development of a contour orchard plan for a large peach grower at McBee, South Carolina. This will be the first important contour orchard demonstration in the South Carolina Sandhills and should attract considerable attention.

"Annual tree measurements were made in the orchard plots of the 6-year-old block and summarized in the following table:

Soil management practices	Average trunk circumference	Increase over 1943
	<u>Inches</u>	<u>Pct.</u>
Clean cultivation (no cover crop).....	17.3	6.1
Grain straw mulch.....	18.4	12.2
Sorghum pomace mulch.....	15.7	9.8
Soybeans-Sudan grass, summer cover crop, winter mulch.....	14.6	5.8
Kobe lespedeza, continuous cover.....	12.6	5.9
Sericea lespedeza, perennial cover.....	13.2	11.9
<u>Winter cover crop</u> <u>Summer cover crop</u>		
Vetch.....Soybeans.....	17.5	10.8
Vetch.....Crabgrass.....	17.4	10.1
Rye.....Soybeans.....	15.5	10.7
Rye.....Crabgrass.....	15.1	10.2
Vetch plots; minimum cultivation*.....	16.7	10.6
Vetch plots; 1-1/2 months cultivation.....	17.8	10.6
Vetch plots; 3 months cultivation.....	18.0	9.8
Rye plots; minimum cultivation*.....	15.0	10.3
Rye plots; 1-1/2 months cultivation.....	15.7	9.8
Rye plots; 3 months cultivation.....	15.1	9.4
Vetch plots; cover crop residues on surface..	19.2	17.8
Vetch plots; cover crop residues turned under	16.9	9.7
Rye plots; cover crop residues on surface....	16.1	11.8
Rye plots; cover crop residues turned under..	14.5	9.0
Soybean plots;cover crop res. on surface.....	17.3	10.9
Soybean plots;cover crop res. turned under...	15.7	10.6
Crabgrass plots;cover crop res. on surface	16.8	10.5
Crabgrass plots;cover crop res. turned under.	15.7	9.0

*Seedbed preparation only.

"A remarkable uniformity of trunk growth during the 1944 growing season is the most outstanding observation which can be made of the above data. It is interesting that at the end of six years the trees receiving the most cultivation and the least or no organic matter additions have started on the downward growth curve. On the other hand the two annual summer cover crops (without winter cover crop in sequence) retain their inferior position. Superiority of 'trashy cultivation,' especially with a winter legume, remains outstanding. Benefits from increased summer cultivation is not significant."

H. L. Borst of Zanesville, Ohio reports: "A brief summary of the 'grassland' or grazing study was completed and included in the annual report. It was found that the annual gain per animal, previously reported as 440 pounds, was actually 381 and the finished weight was 994 pounds instead of 980. A resume of the gains is shown in the following table:

Resume of Cattle Grazing Project - 1944 (11 Animals)

Period	No. days	Feed consumed				Av. Wt.	Gains			Type pasture
		Hay	Pas- ture	Grain			Total	Per animal		
				Total bu.	Bu./head			Total	Daily	
		Tons	Acres			Lbs.	Lbs.	Lbs.	Lbs/head	
Initial weight...						613				
10/15 to 11/20/43.	36	0	10	0	0	641	310	28	.78	Perm.bluegrass
11/20/43 to 5/12/44..	174	11	0	0	0	737	1055	96	.55	
5/12 to 7/3/44...	52	0	12	0	0	831	1040	94½	1.8	Perm.bluegrass and 2 acre alfalfa grass afer 6/12/44
7/3 to 9/15/44..	74	0	20	54½	5¼	983	1670	152	2.0	Alfalfa-grass meadow-pasture
9/16 to 9/26/44..	11	0	10	66¼	6.4	994½	125	11	1.0	Perm.bluegrass
Total....	347	11	32	66¼	6.4	10940	4200	381½		

"1/ One animal did not eat corn until latter half of period."

H. O. Hill of Temple, Texas reports: "Dr. J. R. Johnston has developed a wet combustion method for determining total organic matter. Comparative results of organic matter determinations by the conventional (total carbon by dry-combustion minus inorganic carbon) method and the procedure developed at this Station are reported in the table below.

"Total organic carbon content of calcareous soils can be determined by this wet-oxidation procedure in one-third the time required for the same determination when the (total carbon by dry-combustion minus the inorganic carbon) method is used.

"Organic carbon content of soils as determined
by different methods

Soil number	Kind of soil	Organic carbon content by wet-combustion procedure proposed	Organic carbon content by difference between total carbon by dry-combustion and inorganic carbon
		Pct.	Pct.
237	Calcareous	1.77	1.77
248	Calcareous	2.19	2.34
280	Calcareous	1.21	1.23
D2880*	Calcareous	1.06	1.04
10083*	Non-calcareous	2.09	2.07

"*Samples and data by dry-combustion method supplied by Dr. L. T. Alexander of the Bureau of Plant Industry."

T. C. Peele of Clemson, South Carolina reports: "During January a considerable amount of time was spent in developing and testing various types of transmission heads for use in measuring soil permeability where negative tensions are applied at the top of the soil core and a positive tension at the bottom. Tests indicated that 325 mesh brass sieve cloth can be used with a negative tension of 1-1/2", but it was not as satisfactory as some kinds of cotton cloth. The best transmission head developed so far is one with finely woven cloth fastened over the end of a glass funnel and supported by a perforated porcelain disk. The cloth is held in place by a rubber band with the ends of the cloth covered with paraffin. One other type of transmission head that was found to be very satisfactory consisted of a highly porous alundum disk cemented into the end of a glass funnel with 'Hydrostone.' The transmission rate of the alundum disk was less than that of the cloth transmission heads, but was probably fast enough for use with soils.

"Calibration tests of electrical resistance of plaster of Paris blocks at various moisture tensions using a pressure cylinder and cellophane membrane were continued. A rapid procedure for determining exchangeable calcium in ammonium acetate extracts of soil was tested and adopted for use in the soil studies of this project. Several soil samples sent in by the Operations Division were tested for pH, available phosphorus and potassium."

John Lamb, Jr. of Ithaca, New York submits for our use an abstract of the material presented by J. K. Wilson, Professor of Soil Biology, Cornell University, during an informal seminar discussion held at the Station on January 15: "The effect of moisture on the nodular nutrition of legumes.- The effect of moisture on the physiological activities of plants has been measured by several procedures. One seldom considered is the influence of moisture on the development and maintenance of nodules on legumes. The following statements summarize certain data bearing on this subject. Soybeans were grown on a soil with moisture contents ranging from 25 cc to each 100 grams of dry soil and in steps of 10 cc up to 75 cc. After one month the plants were examined for nodules. On each 100 plants for each moisture content the nodules were 3, 192, 477, 807, 1200, and 1407. Also red kidney beans were grown on soil kept at 20 per cent moisture by frequent weighings. After the plants were well-nodulated, the moisture was spontaneously reduced to 15 in some cases, to 12.5 and to 10 per cent in other cases. The soils were held at these moistures for 24 hours then returned to the original 20 per cent and maintained with this moisture for 10 days. At the start of the drouth each plant had developed about 70 nodules. The effect of the drouth on the stability of the nodules was determined. It was noted that a lowering of the moisture from 20 to 12.5 per cent for only 24 hours caused the bean plants to shed 36 per cent of their nodules. Certain plants lost as many as 57 per cent of their nodules. Plants turned yellow subsequently and lost leaves after the moisture was reduced to 10 per cent. Subsequent observations, after certain plants had recovered from the drouth, showed that each plant had developed another set of nodules."

George W. Hood of Batesville, Arkansas reports: "The outlook for the increased planting of Bermuda grass seed for pasture is extremely favorable. Last year our cooperators in the local district purchased and planted 200 pounds of Bermuda grass seed. This year orders have already been received for about 700 pounds and the seed has been ordered by a local merchant. In practically every case cooperators who planted Bermuda grass seed last year ordered again this year, many of them doubling their orders of last year."

Edgar C. Joy of Brookings, South Dakota reports: "When the corn plots were tested with the wind tunnel soil losses followed the trend of previous years. Soil losses were lowest on subsurface tilled plots, next lowest on plots tilled with the one-way and highest on plots where the residues were plowed under. When effect of residue under any one tillage is compared the plots where all straw is returned have lost the least soil."

"Wind tunnel tests were made on wheat stubble during the fall of 1944. All plowed plots had a high surface wind velocity. They were still cloddy and rough and soil losses were low compared to what would be expected after the clods have largely disappeared from weathering. Subsurface and one-way tillage leave the straw either all or partly on the soil surface and so the surface wind velocities and soil losses were more dependent upon the amount of straw applied on the plot."

DRAINAGE AND WATER CONTROL DIVISION

Hydrologic Land-Use Studies

North Appalachian Experimental Watershed at Coshocton, Ohio -
L. L. Harrold reports: "The chemical analysis of percolates from the 1/500-acre lysimeters for 1944 was completed. These data, along with those for 1941-43, give total ^{nutrient} losses for a complete 4-year rotation, as listed in the following table:

Loss of some of the important plant nutrients (pounds per acre) through leaching; crop rotation 1941-44, corn, wheat, meadow, meadow; lysimeters Y102^{1/} and Y103 ^{2/}

Item	1941 (corn)		1942 (wheat)		1943 (meadow)		1944 (meadow)		4-year total	
	Y102	Y103	Y102	Y103	Y102	Y103	Y102	Y103	Y102	Y103
Rainfall (in.)	39.77	39.61	37.03	36.89	33.04	31.95	30.67	29.60	140.51	138.05
Runoff (in.)	15.24	10.34	.43	.93	.19	.68	.25	.09	16.11	12.04
Percolation (in.)	2.60	2.57	4.39	5.64	11.22	6.61	6.98	4.81	25.19	19.63
Nutrient loss:										
Nitrates (N)	2.63	0.64	3.56	0.75	6.58	2.48	3.72	4.36	16.49	8.23
Potassium (K)	3.63	13.76	4.79	7.57	9.51	23.51	7.17	19.11	25.10	63.95
(K ₂ O)	-	-	-	-	-	-	-	-	30	77
Calcium (Ca)	-	-	11.02	21.92	32.53	34.50	16.28	21.60 ^{3/}	59.83 ^{3/}	78.02
(CaCO ₃)	-	-	-	-	-	-	-	3/149	3/195	
Magnesium (mg)	5.66	6.05	7.94	4.77	21.73	20.38	13.98	18.04	49.31	49.24
(MgCO ₃)	-	-	-	-	-	-	-	-	171	170
Phosphorus (P ₂ O ₅)	Trace or none									

- ^{1/} Muskingum SL, well drained less mature soil. Average of 3 boxes; slope 12.9%
^{2/} Keene SL, fairly well drained more mature soil. Average of 4 boxes; slope 6.0%
^{3/} 3-year total 1942-44.

"The total nutrient losses in percolation may be compared with the nutrients added to the plots during the 4-year period in the form of fertilizer and manures as follows:

Nutrients added to lysimeter plots in 4-year period 1941-44

Type	Rate (Pounds per acre)					
	Y102	Y103	Y102	Y103	Y102	Y103
	N	N	P ₂ O ₅	P ₂ O ₅	K ₂ O	K ₂ O
4 ton manure (fresh-horse)						
w/straw	40	40	22	22	48	48
200 lbs. 2-12-6 fertilizer	4	4	24	24	12	12
300 lbs. ¹ / ₂ -12-6 fertilizer	6	4	36	25	18	13
4 tons ² / ₂ manure (fresh horse)	40	20	22	11	48	24
	90	68	104	82	126	97

1/ Average of 212 lbs. fertilizer applied on Y103 plots.

2/ Average of 2 tons manure applied on Y103 plots.

"A manuscript entitled "A Study of Some Properties of Soil Under Mulch Culture Used in Conjunction with Various Tillage Practices on the Muskingum Silt Loam" was completed and sent to the Ohio Agricultural Experiment Station for review and approval."

Central Plains Experimental Watershed at Hastings, Nebraska -
I. W. Bauer reports: "Total runoff figures for the year show the meadow having the least runoff with subtilled corn having less runoff than any of the cultivated watersheds. The totals were as follows:

	Ave.		Ave.
Contoured Corn	4.02	Contoured Oats	5.70
Subtilled Corn	2.45	Subtilled Oats	4.26
Straight Row Corn	6.34	Straight Row Oats	5.40

Ave.
Corn and Oats Strips 4.53

	Ave.		Ave.
Contoured Barley	3.62	Meadow	.19
Subtilled Barley	5.25	Pasture	2.78
Straight Row Barley	3.37		

Hydrologic Studies at LaFayette, Indiana - R. B. Hickok reports: "Mr. Bedell discussed nutrient losses in runoff before a joint session of the Indiana Corn Growers' Association and the Indiana Soil Science Society, on January 9, in connection with the annual Agricultural (farmer's) Conference at Purdue. Purdue Agronomy Department Mimeographed Paper No. 61, 'Improved Practices Reduce Loss of Available Nutrients in Run-Off', was distributed at this meeting."

Hydrologic Studies at East Lansing, Michigan - R. G. White reports: "By the end of January, frost had penetrated to a depth of 18 inches under an 8-inch blanket of snow, but under a 14-1/2 inch blanket of snow there was no frost at a depth of 1 inch."

Runoff Studies

Runoff Studies at Fennimore, Wisconsin, and Edwardsville, Ill. - N. E. Minshall reports: "Mr. Krimgold spent the week of January 17 - 22 in this office working out simplified instructions for the design of small farm ponds for the Claypan Prairie area."

"Mr. L. A. Jones, Chief of the Division, visited this project on January 23, and conferred with Mr. Noble Clark, Associate Director, Wisconsin Agricultural Experiment Station and Professor Arnold Lenz on the proposed Conservation Structure Study in cooperation with the Wisconsin Valley Improvement Company on hydrologic research in the Wisconsin River Valley."

Runoff Studies at Colorado Springs, Colorado - H. K. Rouse reports: "Analysis of the records of runoff during 1944 revealed that the number of runoff periods recorded was 33 percent below the 7-year average even though both annual precipitation and the number of excessive rainstorms recorded were substantially equal to normal. In search of an explanation, the entire 7-year record was examined and the principal causes appear to be the differences in the pattern and distribution precipitation."

"It was found that snow, mixed rain and snow, and rains amounting to less than 0.25 inch rarely produced surface runoff. For the purposes of water supply from surface runoff such precipitation may be designated as 'non-productive.' Over the 7-year period of record this non-productive precipitation has amounted to from 45 percent to 50 percent of the annual for the several watersheds with an overall average of 47 percent. In 1944 the proportion of non-productive precipitation was much greater with a range of from 60 percent to 67 percent and an overall average of 65 percent. Conversely productive precipitation (that which possibly might have resulted in surface runoff) was 34 percent less than average even though annual precipitation was approximately normal. This is almost exactly the same as the percentage reduction in the number of runoff periods."

Runoff Studies at Fayetteville and Bentonville, Ark., Muskogee, Okla., and Garland, Texas - V. D. Young reports: "During the calendar year of 1944, the 10-acre cultivated watershed lost 33.2 percent of the rainfall while a 19.4-acre mixed crop watershed lost only 7.7 percent. A wooded area of 24 acres lost twice as much as 9.3-acre pasture area with a good grass cover. Both these latter watersheds are on Baxter Soils."

"The cultivated watershed has 59 percent of its area on Baxter Soils and 24.7 percent on Centerton Silt Loam Soils. In the case of the mixed-crop watershed, 41.2 percent of the area is a Centerton Silt Loam Soil, while 35.2 percent is a Baxter Soil.

"A 10.75-acre terraced watershed having 49 percent of its area on a Centerton Silt Loam Soil and 51 percent on a Newtonia Silt Loam Soil lost slightly less than half as much of the rainfall as runoff as did the cultivated watershed of nearly the same area. However, this area was in meadow during the year and was pastured after the second cutting of hay. The cultivated watershed was cropped to grain followed by a crop of millet during the 1944 season."

The following table was prepared by D. B. Krimgold from the information given in Mr. Young's report and other data available in his office. The cover and tillage of W-III may not be as shown.

No.	Major Soils	Watershed		Rainfall Inches	Runoff Inches	Percent of Rainfall
		Drainage Area Acres	Cover and Tillage			
W-I	Baxter 59% Centerton Silt Loam 25%	10	Grain followed by millet	47.84	15.89	33.2
W-II	Baxter	9.3	Pasture	46.40	.62	1.3
W-III	Baxter 84%	14.25	Pasture and brush	48.51	.0008	.002
W-IV	Baxter	24	Woods	48.62	1.25	2.6
W-V	Baxter 35% Centerton Silt Loam 41%	19.4	Mixed crops	47.92	3.67	7.7
W-VI	Centerton Silt Loam 49%	10.75	Terraced, meadow, pastured after 2nd cutting	44.65	6.94	15.5

Runoff Studies at Danville and Blacksburg, Virginia - T. W. Edminster reports: "While in Pittsylvania County the Project Supervisor, together with Mr. John Kane, Soil Surveyor for the Blue Ridge Mountain District, Mr. W. M. Perry, and Mr. Jackson M. Betts, Work Unit Technicians, visited 16 of the fish-pond dams in that area. Of the 16 dams visited, 8 had been washed out at the time of the September flood. A number of pictures were taken of both standing and washed-out dams. Soil samples were taken by Mr. Kane for return to our soils laboratory for analysis, while a general survey of engineering figures involved in the construction and failure of the dams was made. Since that visit, Mr. Robert Devereaux, Mr. Kane, and myself have had several conferences to talk over the potential use of the information gathered on these fish-pond dams"

Hydraulic Studies

Hydraulic Studies at Logan, Utah - C. W. Lauritzen reports:

"A striking difference was observed between snow cover on stubble and seeded areas. Shortly after the thaw began the seeded areas had become practically bare while the stubble areas retained a considerable snow cover. It was also evident that there had been much more drifting into the terraced channels adjacent to the seeded areas than those adjacent to the stubble areas. Some slight erosion occurred between terraces on the seeded areas. This was mostly in the form of small rills."

Hydraulic Studies at Corvallis, Oregon - A. W. Marsh reports: "Plotting barley yield against infiltration rate produced a smooth, steeply ascending curve with all but 5 points lying close to the curve. This demonstrates the importance of improving the infiltration rate to obtain better yields. Four of the 5 points were from plots receiving 6 and 12-hour irrigations. The more rapid infiltration obtained with these brief irrigations did not compensate for the decreased total time of application for the season."

"Plotting infiltration rate against application head for 3 durations of water application, 24, 48, and 72 hours, each with and without a covering of straw as left by the combine showed the following features:

1. In all trials increasing heads gave increasing infiltration rates;
2. Nearly all points from plots having straw cover were higher than those from plots without straw, regardless of duration or head;
3. With other factors constant the infiltration rates were lowered as the duration increased."

Hydraulic Studies at the California Institute of Technology, Pasadena, California - Vito A. Vanoni reports: "Reprints of the following paper are available for distribution: 'Baffle Type Energy Dissipator for Pipe Outlets' by Vito A. Vanoni and James T. Rostron, Agricultural Engineering, vol. 25 Nos. 8 and 9, pp. 301-304, August, and pp. 341-348, September 1944."

"The Research Project Supervisor addressed the annual meeting of the Ventura Engineers' Club on January 12 on the subject, 'The Hydraulic Laboratory as a Tool for Engineering Design.'"

Sedimentation Studies

C. B. Brown reports: "During the last week in the month, I made an investigation of the critical water-supply shortage at Columbus, Ohio. The public water supply for Columbus is obtained from the Scioto River on which the city has 2 storage reservoirs. The causes of the water shortage were: (1) a precipitation deficiency of 7.28 inches from June 1, 1944 to February 1, 1945; (2) continuously frozen ground since December 11, 1944; and (3) silting in the 2 storage reservoirs. The lower Griggs Reservoir, built in 1905, had lost 25.7 percent of its capacity by 1934. The Upper O'Shaughnessy Reservoir, built in 1925, had lost 14.6 percent of its capacity in 1942. The sediment deposited in the two reservoirs occupies space that would hold 30 days' supply of water. The reservoirs have been drawn down continuously since June 26, 1944 and were dry by the last week in January. The city was forced to resort to various emergency measures such as pumping from old quarries and laying temporarily a pipe line to the Olentangy River. Even so, the water supply had to be drastically curtailed and critical war plants were forced to shut down for short periods. Since the freeze broke about the middle of February as was expected, it is apparent that the situation would never have become critical had it not been for the loss of 30 days' storage space in the city's reservoirs because of silting."

Sediment Studies at the Cooperative Laboratory, California Institute of Technology, Pasadena, California - Vito A. Vanoni reports: "Experiments were continued in the 10-inch flume with high rates of transportation. These rates were in excess of the highest attained in Gilbert's classical experiments."

"In cooperation with the District Office at San Fernando two cross sections in the Eaton Wash were dyed with a view to determining the depth of bed scour during the present runoff season. Sand is dyed to depths of about 10 feet at several points in each cross section. To obtain the maximum depth of scour after a flow, the sand is excavated until the undisturbed dyed sand is found. This surface then shows the depth to which the sand was moved. One of the sections in Eaton Wash was about 200 feet upstream from East Broadway and the other about the same distance from the Encinita Avenue Crossing. Both sections are in a sandy bed and the channel has pipe and wire-side revetment, but no bottom protection."

"Dye injections were also made in cooperation with the Southern Pacific Railway and at two bridges in the Simi Wash. Since deep scour is expected at the bridges because they are at narrow points and also constrict the stream, injections were made as deeply as possible. The sand in the bed was from 10 to 15 feet in depth. Beyond the sand a tough layer of material was encountered which made it impossible to drive the injection pipe further."

Drainage Studies

The Everglades Project at Ft. Lauderdale, Florida - C. Kay Davis reports: "We borrowed a weasel from the Opa Locka Naval Base this month and have been using this equipment to complete our surveys north of the Tamiami Trail. We have been unable to get into this area with any of the equipment which we have available, but this implement is capable of going anywhere and coming back. As a result of our surveys in the area west of the Miami Canal and north of the Tamiami Trail during this month, we will likely make some revision in our surface water-courses map.

"During the month of February we expect to run one line north of the Trail through the Big Cypress Swamp area and we will then have completed the line-running necessary for a complete topographical map south of Lake Okeechobee, with the exception of the Hillsboro Lake area."

Drainage Investigations at St. Paul, Minnesota - D. G. Miller reports: "I was in Milwaukee this week and the forenoon of January 10 gave a talk at the Engineering Conference. Some 25 were present at the time I talked on the subject 'Durability of Drain Tile in Peat and Alkali Soils of the Upper Mississippi Valley.'"

IRRIGATION DIVISION

M. L. Nichols, W. W. McLaughlin, George D. Clyde, O. W. Israelsen, R. L. Parshall, O. W. Monson, and J. H. Maughan attended the conference on irrigation and drainage research, held at the Utah State Agricultural College, Logan, January 22-24. The general purpose of the meeting was to clarify cooperative efforts by State Experiment Stations and various Federal agencies, to solve irrigation and drainage-research problems. The discussions generally centered on the following subjects: Soil and irrigation relationships; plant and irrigation relationships; irrigation water supplies; and drainage and reclamation of agricultural lands. The conference was well attended and practically all of the Western States experiment stations were represented by one or more delegates.

Water Requirements for Irrigation

Methods of Estimating Irrigation Requirements

At the request of the Regional offices of the Western States, a method of estimating water requirements in irrigated areas from climatological and other data has been developed by Harry F. Blaney and Wayne D. Criddle. Factors considered in the procedure include length of growing (or irrigation) season; mean monthly temperatures, monthly percent of daytime hours, monthly precipitation, consumptive use of water and efficiency of irrigation. A preliminary report covering typical areas in the Western States is nearing completion.

Investigation of Sources and Storage of Irrigation Water

Snow Surveys and Water-Supply Forecasts

J. C. Marr reports conferences with Weather Bureau officials from Washington regarding a new undertaking by that Bureau, which plans to forecast stream flow on a month-to-month and week-to-week schedule. Basis for these forecasts is to be 48 percent current data, the rest records of past years.

R. A. Work called on E. M. Tucker of Soda Springs, California, to observe operation of his machine, the Tucker Sno-Cat. With a few improvements, this machine looks useful for snow-survey work. Tentative arrangements were made for Mr. Tucker to bring his machine to Medford for more thorough and difficult tests. The demonstrated model of the machine is supported in front by two skis which serve also to steer the machine. The machine is supported at the rear on two oblong stainless steel tanks each about 72 inches long and 16 inches wide. Power from an 80 h.p. engine is applied through a 4-speed transmission and truck differential to four sprocket gears, two in each tank, which engage and positively drive an open link track endlessly around the rear supporting tanks.

In the tests at Soda Springs the machine was driven several miles on 30-40 inches of 30 percent density snow, crossing logs, open railroad tracks, stream channels, etc., at speeds of 8-10 m.p.h. in second gear. Grades up to 24 percent were readily ascended in softer snow. One grade of 34 percent over down logs was ascended, but the machine stalled in soft snow on grades over 34 percent. In hard snow it might climb steeper grades. The machine traversed side slopes of 25 percent without difficulty and without appreciable side slippage. On the trip into Sugar Bowl on unbroken trail, a trailer loaded with 1,600 pounds of steel was towed, plus 2 passengers on the sled and 3 passengers on the Snow-Cat. Gasoline consumption on the round trip of 7 or 8 miles was about 1 gallon. High gear speed of this machine appears about 12-15 m.p.h. The machine turns in a radius of about 40 feet, but shorter turns can, of course, be made by backing. Machine width is about 56 inches.

Drainage of Irrigated Land

Imperial Valley Drainage Investigation

V. S. Aronovici reports that in an effort to understand better the effect of water-table levels on moisture retention of the materials overlying the water table, a tank 32 inches deep and 42 inches in diameter was set up and filled with a fine sand, similar to that of the Dorman Farms plot. A series of 5 manometers was placed at 6-inch intervals on the tank side. A tensiometer was placed 6 inches below the surface of the sand in the tank and so connected that it may be read on the manometer board to which are also connected the tank manometers. This makes possible quite accurate water-table measurement in the tank. A wooden cover was placed over the top of the tank to minimize surface evaporation. A water intake was placed on the bottom of the tank and a standpipe with an overflow was installed so that the head at which water is applied to the tank may be controlled. The observation procedure is as follows: The sand is saturated from below. When all manometers reach equal pressure, indicating moisture equilibrium, a specified quantity of water is withdrawn from the tank. This quantity is measured and the reduction in moisture content of the sands above the water table is determined. The water table will be dropped in stages as described above; however, moisture sampling will be made in 6-inch increments from the surface down to the water table at each observation. Data from these observations will then be compared with tension-table description curves of the same material. From these studies it is believed that a rather thorough picture of the soil-moisture relationships between water table, irrigation and consumptive use may be obtained. Further studies of related problems are planned.

3/27/45